

Fig.

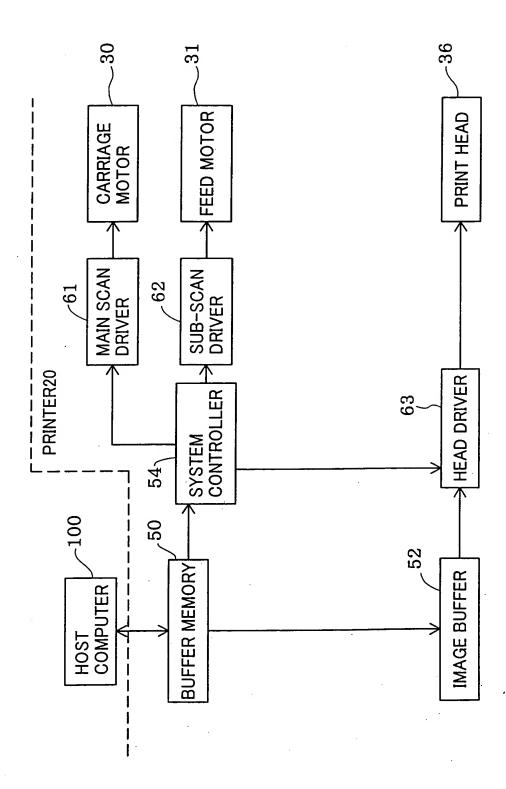


Fig.

OBLON, SPIVAK ET AL.

Y: Koichi OTSUKI

CKET # 219738US2 CONT EET <u>3</u> OF <u>26</u>

40 #K1 #Y1 O 0 0 **★** k=6[dots] 0 40Y #Y15 0 #K15 1 2k 0 #K16 #K17 #M1 0 0 0 0 40M · MAIN SCAN 0 0 #M15 0 0 #K31 2k 0 #K32 × #K33 #C1 0 0 0 0 PAPER P 40C PRINTING AREA PA 0 0 0 #K47 #C15 0 #K48 PAPER FEED COLOR BLACK (SUB-SCAN) NOZZLE NOZZLE ARRAY ARRAY 40K

$F \ i \ g$. 4 (A) CONCEPT OF SUB-SCAN FEED(s=1)

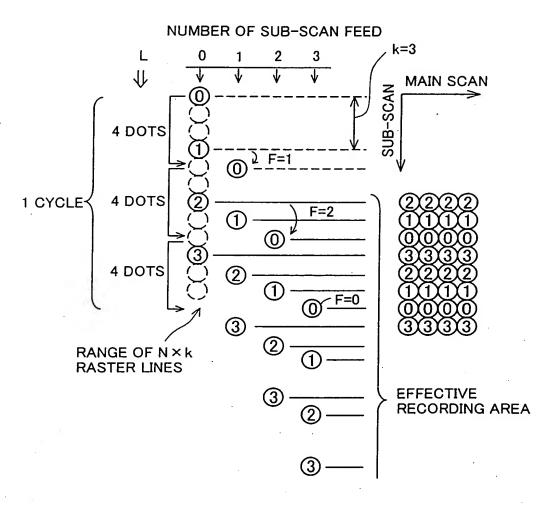


Fig. 4 (B) PARAMETERS

NOZZLE PITCH k : 3 [dot] NUMBER OF USED NOZZLES N : 4 NUMBER OF SCAN REPEATS s : 1

NUMBER OF EFFECTIVE NOZZLES Neff: 4

NUMBER OF SUB-SCAN FEED	0	1	2	3
FEED AMOUNT L [dot]	0	4	4	4
ΣL	0	4	8	12
F=(ΣL)%k	0	1	2	0

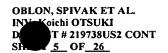


Fig. 5 (A) CONCEPT OF SUB-SCAN FEED(s=2)

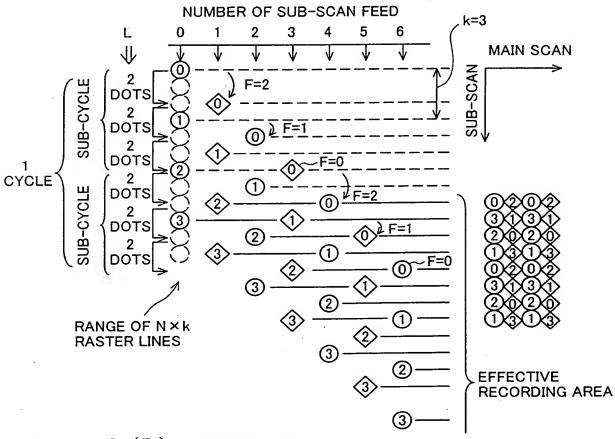


Fig. 5 (B) PARAMETERS

NOZZLE PITCH k : 3 [dot] NUMBER OF USED NOZZLES N : 4 NUMBER OF SCAN REPEATS s : 2

NUMBER OF EFFECTIVE NOZZLES Neff: 2

NUMBER OF SUB-SCAN FEED	0	1 .	2	3	4	5	6
FEED AMOUNT L [dot]	0	2	2	2	2	2	2
ΣL	0	2	4	6	8	10	12
F=(ΣL)%k	0	2	1	0	2	1	0

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1

Fig. 6

SCAN PARAMETERS IN FIRST EMBODIMENT

Nozzle pitch: k = 6 [dots]

Number of scan repeats: s = 1

Number of working nozzles: N = 13

Number of effective nozzles: Neff = 13

							_
PASS No.	1	2	3	4	5	6	7
SUB-SCAN No	0	1	2	3	4	5	6
FEED L [dots]	0	13	13	13	13	13	13
$\Sigma \Gamma$	0	13	26	39	52	65	78
$F=(\Sigma L)%k$	0	1	2	3	4	5	0

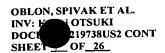


Fig. 7
WORKING NOZZLES IN FIRST EMBODIMENT

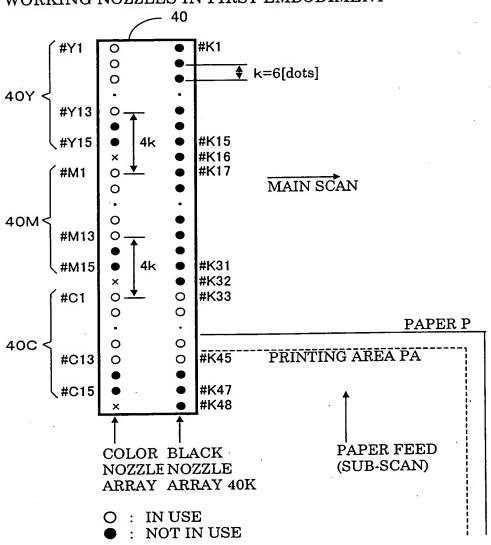




Fig. 8

FIRST EMBODIMENT

RASTE	D					1.1			314T1	301	אנדר <i>ב</i>	ווידר	1									
LINE	10					D/	100	No														
No.	1	:	2 :	3 4	4			7 7		9 1	0_1	1 1	2 1	2 1	, ·	5	16 1	7 1	0 1	0		
1	C11	_	1		Ť	<u> </u>			<u> </u>	Ť:	Ť:	' ' '	M		-		'	′ ' '		4	7	
2		С	9	1-			1	MI	2	十	+	+	 '''	· 		十	+	╅	+	7 Y:	7	
3		1	Tc	7		1			M1	0	1-	†	\top	- Kara	_	13	+	+	┰	+	H	
4				C	5		1		\top	M	18	\top	\top	\top	\top		11		+-	+-	1	
5					C	3	\perp				М	5	\top	T	\top	\top	7	9		\top	1	
6		<u>_</u>		<u></u>	<u> </u>	C1					$oldsymbol{ol}}}}}}}}}}}}}}}$	M	4		I	\perp		Y	7		Cmi	s
7	C12	!						<u> </u>	$oldsymbol{oldsymbol{oldsymbol{I}}}$		\mathbf{I}_{-}	L	M	2	$oxed{\mathbb{L}}$		\Box	T	TY	5	Mm	= is
8		C10	<u> </u>	1				MI	3			T	T	X	T	\top	T		T	Y3		=
9			C	_					M1	1			П								YI	Ymis
10	<u> </u>	$oxed{oxed}$	_	CE	_		<u> </u>	1_	1_	М	9				\mathbf{I}	Y	2	-	\top	T	T	T
11	L.	ـــــ	╀~	↓_	C4			4_	↓	1_	M7	1			$oldsymbol{oldsymbol{oldsymbol{oldsymbol{\Box}}}$		Y1	0				
12		<u> </u>	 	<u> </u>	<u> </u>	C2	-	<u> </u>	<u> </u>	<u> </u>	<u></u>	M	<u>il</u>				<u> </u>	Y	В			Cmis
13	C13		 	<u> </u>	↓_	_	×	.		丄	Щ.	$oldsymbol{ol}}}}}}}}}}}}}}}}}$	M3	L				. [.	Y	3		
14	L	C11	+	_	_		$ldsymbol{ldsymbol{eta}}$		4	<u> </u>		<u> </u>		М				<u> </u>		Y4		Mmis
15			C9	+	_		<u></u>		M1:	_		<u> </u>									Y2	Ymis
16			ļ	C7		<u> </u>	L_	1_	Ļ	M10	-	<u> </u>	<u> : </u>	_	1_	Υı	_					
17		<u> </u>	├	↓	C5	+	<u> </u>	↓	╄.	<u> </u>	M8	+	<u> </u>		1_	\perp	Y1	_	$oldsymbol{ol}}}}}}}}}}}}}}}}}$			
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19 20	26000	C12	╁	├	├		C1	8816	1	╫	┼-	├	M4	+	+	4-	-	↓_	Y7	-		
21		0:2	C10	\vdash	 	<u> </u>	-	<i>711/18</i> 2	M13	+	┿-	⊢	-	M:	-	┪	+		ļ	Y5		
22			1010	C8	\vdash	-	-	⊢	IMI	M1 1	-	├	├—	-	-×	- W		╂—	—	-	Y3	344
23			╁─	- 00	C6			 	╁	1411	М9	┢─	-	-	╁	- 100	712	:-	┼	ļ .		Y1
24				\vdash		C4		 	 	╁╌	1.713	M7	╁─	┝╌	╁	+	+111	Y10	1	\vdash		
							C2		H	\vdash	<u> </u>		М5	┝╌	+	+	+	+	Y8	-		\dashv
26		C13						×		\vdash				МЗ	+	+-	+	 	 	Y6		
27			C11												м	il	\vdash	\vdash	_	H	Y4	\neg
28				C9						M12								t-	Г	\Box		Y2
29	Ļ				C7						M10						Y13					
30	Ļ					C5				_		M8						Y11				
31	Ļ	uun				1	C3			<u> </u>			М6			ļ			_Y9			
32								C1		<u> </u>				M4	+	↓_		!	<u></u>	Y7		\Box
33	H		C12	212	\dashv		_			_	 				M:	-	-	<u> </u>		\sqcup	Y5	
34	H			C10						M13	-					×			L	$\sqcup \downarrow$	_	Y3
35 36	H	\dashv			C8	C6		\dashv			M11	-			<u> </u>	-			<u> </u>		_	\dashv
30 37	 		\dashv			- 6	C4					М9	M7		<u> </u>	+	-	Y12	V: 5	\sqcup		\dashv
38			-	 		-		C2			 		M/	M5	 	╁	+-	\vdash	Y10	Vo		
39	2		C13		\dashv	\dashv	\dashv	- 02	×		$\vdash \vdash \vdash$	\dashv		CIM	M3	-	+-	\vdash		Y8	ᆔ	
40		H	\rightarrow	C11	-	-+	-				\vdash	-			M	M1	—	\vdash			Y6	Y4

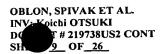
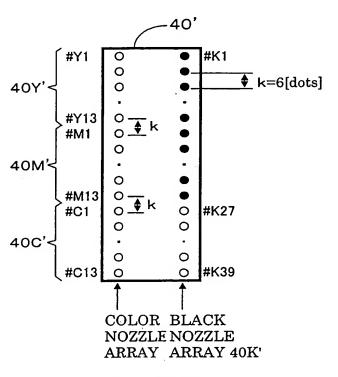


Fig. 9
WORKING NOZZLES IN FIRST COMPARATIVE EXAMPLE



O: IN USE

• : NOT IN USE

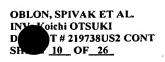


Fig. 10

FIRST COMPARATIVE EXAMPLE

RASTER LINE PASS No.	
	
No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 1	9
1 C11 M11 Y11	
2 C9 M9 Y9	
3 C7 M7 Y7	
4 C5 M5 Y5	
5 C3 M3 Y3	•
6 C1 Y1 Cm	nis, Mmis, Ymis
7 C12 M12 Y12	
8 C10 M10 Y10	
9 C8 M8 Y8	
10 C6 M6 Y6	
11 C4 M4 Y4	
	is, Mmis, Ymis
13 C13 M13 Y13	
14 C11 M11 Y11	
15 C9 M9 Y9	
16 C7 M7 Y7	
17 C5 M5 Y5	
18 C3 M3 Y3	.
19 C1 M1 Y	4
20 C12 M12 Y12	4
21 C10 M10 Y10 Y8	-
	Ⅎ
	-
24	뒭
25 C13 M13 Y13 Y	7
27 C11 M11 Y11	┪
28 C9 M9 Y9	7
29 C7 M7 Y7	2
30 C5 M5 Y5	7
31 C3 M3 Y	3
32 C1 M1	Y1
33 C12 M12 Y12	
34 C10 M10 Y10	
35 C8 M8 Y8	
36 C6 M6 Y6	
37 C4 M4 Y	
38 C2 M2	Y2
39 C13 M13 Y13	
40 C11 M11 Y11	

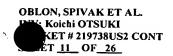
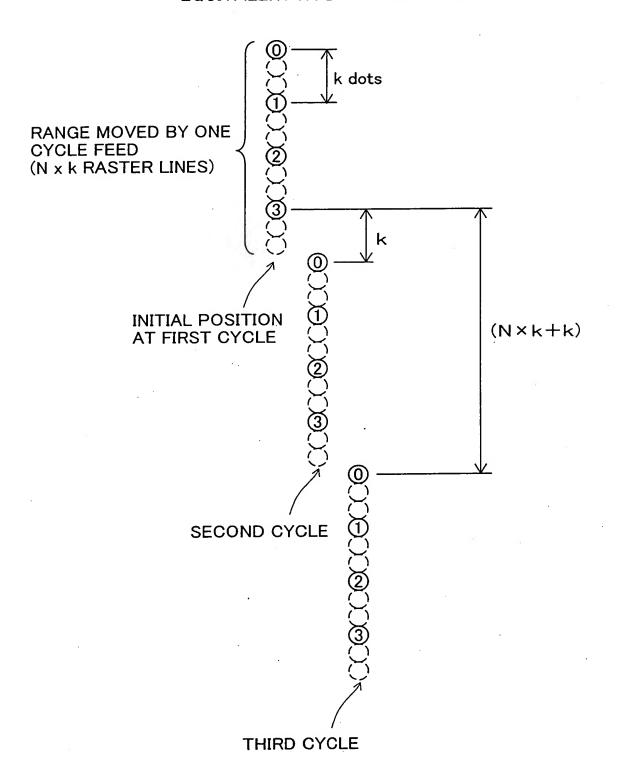


Fig. 11

EQUIVALENT NOZZLE POSITIONING



ling II man

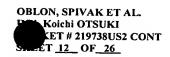


Fig. 12

SCAN PARAMETERS IN SECOND EMBODIMENT

Nozzle pitch : k = 6 [dots]

Number of scan repeats: s = 1

Number of working nozzles: N = 15 Number of effective nozzles: Neff = 15

PASS No.	1	2	3	4	5	6	7
SUB-SCAN No	0	1	2	3	4	5	6
FEED L [dots]	0	14	15	16	16	15	14
ΣI_i	0	14	29	45	61	76	90
$F=(\Sigma L)%k$	0	2	5	3	1	4	0

Fig. 13
WORKING NOZZLES IN SECOND EMBODIMENT

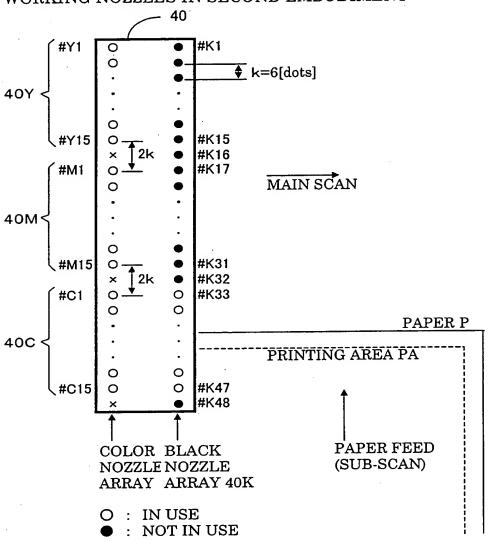




Fig. 14

SECOND EMBODIMENT

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RASTE	R							_					·									
LINE							SS I								4-			4.0	10			
No.	1	2	3	4	5	6	7	8		10	11,	12	13	14		16	-1/	-18	19			
1			C8						М9						Y10						V	
2	C13						M14						Y15			+	3/5		Cmis.	Mmis,	Ymis	į
. 3					C3		$ldsymbol{ld}}}}}}$				M4		_				Y5					
4		C11						M12					_	Y13								
5				C6						M7						Y8		-				
6						C1	<u> </u>					M2			244.4			Y3	٠,	V:-		
7			C9				<u> </u>		M10		_			_	Y11	_				Ymis_		•
8	C14						M15						×						YII	Cmis, I	vimis	
9					C4						M5						Y6					
10		C12						М13		\Box				Y14								
11				C7			L_			M8						Y9			\dashv			
12						C2						М3						Y4	-		v .•.	
13			C10						M11						Y12					Mmis, `	TMIS	
14	C15						×						M1	<u> </u>		-			Y2			
15					C5				L		M6						Y7					
16		C13						M14		$oxed{oxed}$				Y15	_	144.0						
17				C8		<u> </u>	<u>L.</u>	<u> </u>	L	М9	1			<u> </u>		Y10		7/5	\vdash			
18						C3	L_			Ш		M4		<u> </u>	1.// 2			Y5	-	0:- 1	M!-	V-:-
19			C11			<u></u>	<u> </u>		M12						Y13					Cmis, I	vimis,	- mis
20						ļ	C1	<u> </u>					M2	├ —	<u> </u>		7/0		Y3			
21					C6		L	<u> </u>	<u> </u>	\sqcup	M7			-	 	<u> </u>	Y8		\vdash	Y1		
22		C14					<u> </u>	M15					╙	×	<u> </u>	100.0						
23				C9			<u> </u>	<u> </u>		М10			Ŀ		<u> </u>	Y11		Y6	\vdash			
24			<u> </u>			C4	ļ	<u> </u>	<u> </u>			M5	<u> </u>	<u> </u>	1244	_		10	-1			
25			C12				L-	 	M13	_			 	├-	Y14	<u> </u>			Y4			
26		L	L		L		C2	!	 				МЗ		├—	 -	Y9		H			
27				L	C7		Ļ_			ļ	M8				₩		-		\vdash	Y2		
28		C15			<u> </u>	┞	₩	×	 			\vdash	 	M1	├─	Y12	_	_		- 		
29				C10			 	_	 - -	M11	_	М6		├	 	112		Y7	_	\vdash		
30					<u> </u>	C5	4-	┼-	1414	_		MID		├	Y15	 	 -			\vdash		
31			C13	ļ		ļ	+-	-	M14	-		├	M4	-	110		-	┢	Y5			
32			<u> </u>			-	C3	+-		 -	М9	-	1717	-	╁─	╁	Y10	 				
. 33			<u> </u>	<u> </u>	C8	⊢	₩	1	╁─	├	IVIS	-	├	M2	┰	-		-	\vdash	Y3		
34			<u> </u>	011	├	₩	\vdash	C1	├-	M12			\vdash	1712	$oldsymbol{+}$	Y13	-	_				
35			 	C11		-	+-	+-	├-	W 12	-	M7	\vdash	 	 	╁╌ざ	 	Y8	 	$\vdash \vdash \vdash$		
36			-	<u> </u>	<u> </u>	CE	' 	┼	M15	 	\vdash	 '''	\vdash	+-	×	 	_	 	\vdash	$\vdash \vdash \vdash$	YI	
37			C14	i –	 	├	T _{C4}	+-	IVIID	+-	 	\vdash	М5	1	 ~	 	<u> </u>		Y6		-	
38				 -	C9	├	1 64	+-	\vdash	+-	M10	<u> </u>	1	\top	\vdash	f	Y11	t		\vdash	\Box	
39			—	\vdash	<u> </u>		┼-	C2	_	-	14110	\vdash	\vdash	МЗ	1	\vdash	t · · ·	一	t	Y4		
40			L	ட	L	ь	┺-	1 02	·1		Ь		ь	1 ,,,,,	Т	L		ч—		لننا		

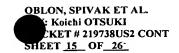
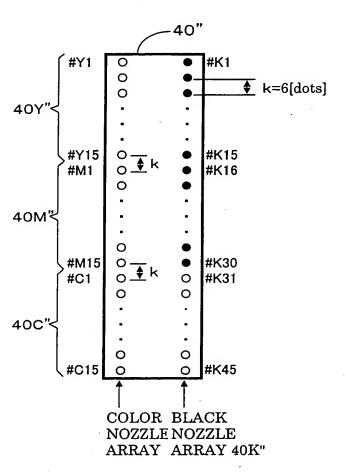


Fig. 15
WORKING NOZZLES IN SECOND COMPARATIVE EXAMPLE



O: IN USE

• : NOT IN USE

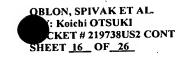


Fig. 16

SECOND COMPARATIVE EXAMPLE

RASTE	R																				
LINE						PA	SS	No.													
No.	1	2	3	4	5	6	7	. 8	9	10	11	12	13	14	15	16	17	18	19		
1			C8						M8		I				Y8			}			
2	C13						M13		<u> </u>				Y13					Cmi	s, Mn	nis, Ymis	
3					C3					1	МЗ						Y3				
4		C11					•	M11					Ĺ.	Y11]			
5				C6		L				М6						Y6			_		
6					<u> </u>	C1		<u> </u>				M1						Y1]		
7			C9					<u> </u>	М9		<u> </u>	<u> </u>		<u> </u>	Y9	_	<u> </u>				
8	C14	<u>l:</u>	<u> </u>			<u> </u>	M14	<u> </u>		<u> </u>	<u> </u>	<u></u>	Y14	<u> </u>	<u> </u>	<u> </u>	<u> </u>		Cmi	s. Mmis, Yn	nis
9		<u>_</u>			C4		_				M4			_			Y4				
10	∟	C12						M12	L.	<u> </u>		L	<u> </u>	Y12	<u> </u>	<u> </u>	<u> </u>		1		
11	<u> </u>			C7		<u> </u>	<u> </u>	ļ	<u> </u>	M7				ļ		Y7	<u> </u>	<u> </u>			
12	L_	<u> </u>		L		C2		ļ	<u> </u>	<u> </u>		М2				<u> </u>		Y2			
13	<u> </u>		C10				_		M10		L	ļ	<u> </u>		Y10			<u> </u>	l		
14	C15						M15		<u> </u>				Y15	<u> </u>	<u> </u>	<u> </u>			Cmi	s, Mmis, Yn	nis
15					C5						M5				<u> </u>		Y5		Į		
16		C13						M13	<u> </u>	<u> </u>				Y13	<u> </u>				1		
17				C8						М8				<u> </u>		Y8			l		
18		L				C3				ļ		М3		<u> </u>		ļ		Y3	1		
19			C11						M11				144	<u> </u>	Y11					ı	
20					- 00		C1		 	<u> </u>	240		M1	ļ.—	<u> </u>				<u>Y1</u>		
21	,	214		-	C6				<u> </u>		M6			144.4	-		Y6				
22	- 1	C14		-00	-			M14		М9				Y14		Y9					
23			-	C9	-	C4			<u> </u>	MIS		M4				19		Y4			
24 25			C12	-	-				M12			1714			Y12	-		-17			
25 26			012		-		C2		14112		_		M2		112				Y2		
20 27				-	C7		- 02				M7		1412				Y7				
28	- 1	C15		i	- 			M15						Y15							
29		-	\neg	C10	\neg					М10						Y10					
30				-		C5						М5				-		Y5			
31		ı	C13			\neg			M13.			_			Y13						
32				\neg	T	\neg	СЗ						МЗ						Y3		
33			\neg	\neg	C8						М8	T					Y8				
34		Ī	一	\neg	一			C1						M1			-			Y1	
35		ĺ		C11						M11						Y11					
36		-				C6				-		M6						Y6			
37			C14						M14]				Y14						
38						\Box	C4			I			M4]		Y4		
39		[l	C9						М9]]		Y9				
40		L						C2						М2		I				Y2	

there are the first grad grad and the first state was the first st

Fig. 17
FIRST ACTUATOR VARIATION

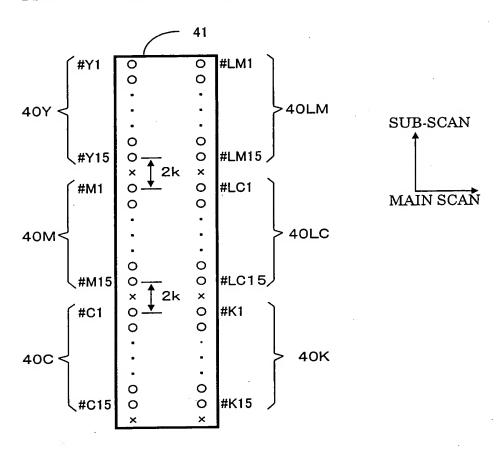
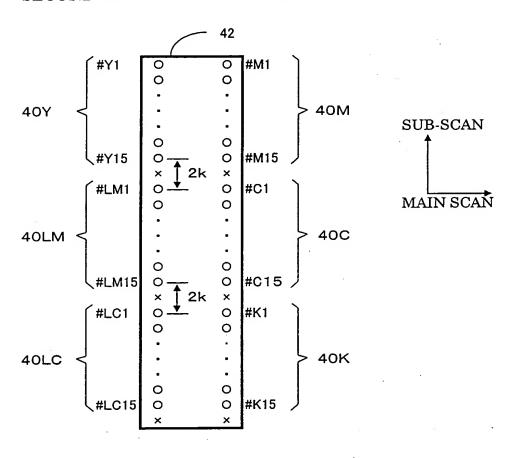


Fig. 18
SECOND ACTUATOR VARIATION



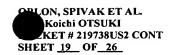
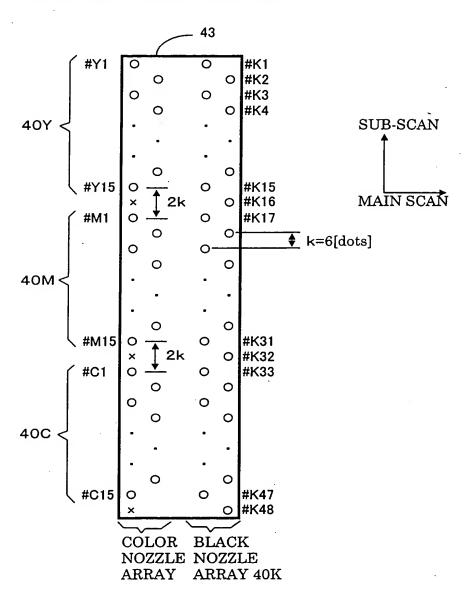


Fig. 19
THIRD ACTUATOR VARIATION



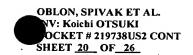
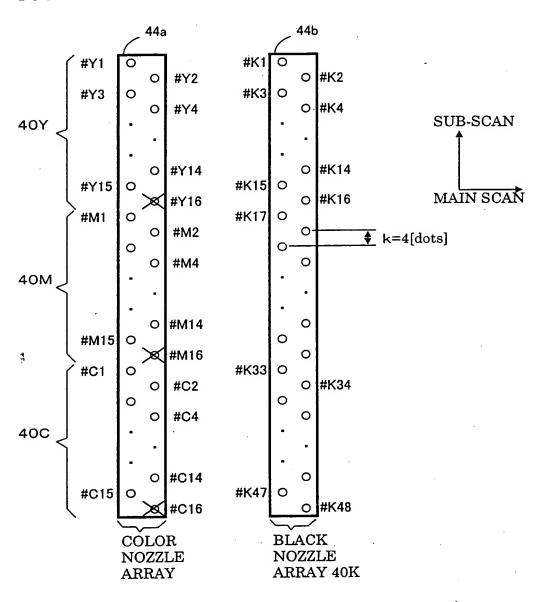


Fig. 20
FOURTH ACTUATOR VARIATION



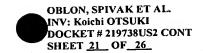
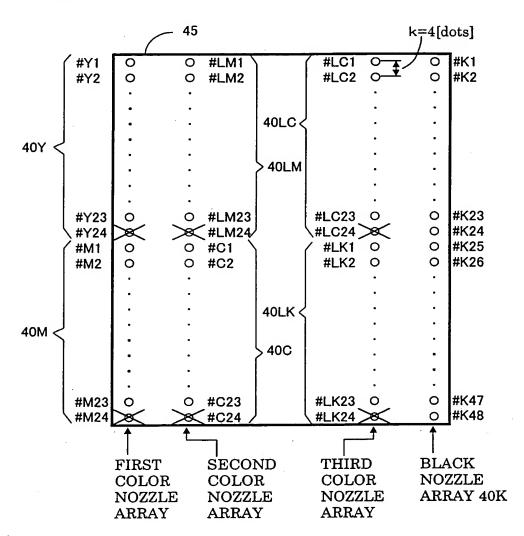


Fig. 21
FIFTH ACTUATOR VARIATION



MAIN SCAN

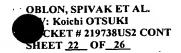
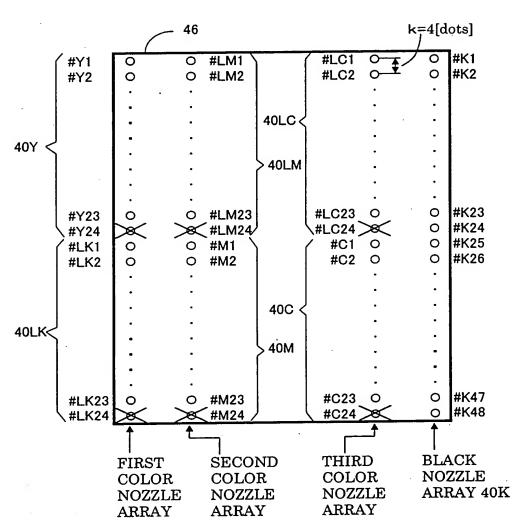


Fig. 22
SIXTH ACTUATOR VARIATION



MAIN SCAN

Fig. 23
SEVENTH ACTUATOR VARIATION

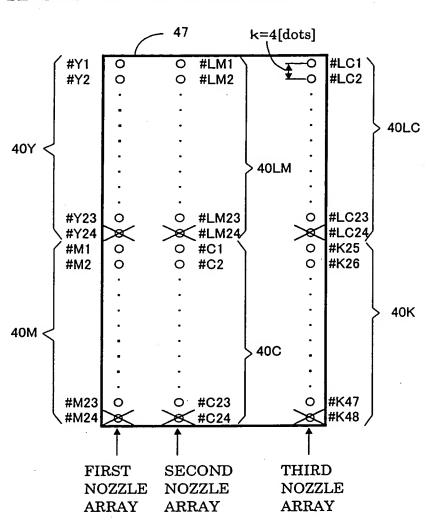
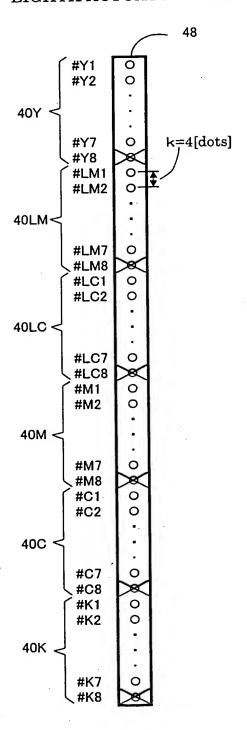


Fig. 24
EIGHTH ACTUATOR VARIATION



INTERLACE SCHEME

NUMBER OF NOZZLES: N = 3
NOZZLE PITCH: K = 2 [DOTS]
NUMBER OF SCAN REPEATS: s = NOZZLE DENSITY: D [DOTS/INCH]
SUB-SCANNING PITCH: L [INCH]

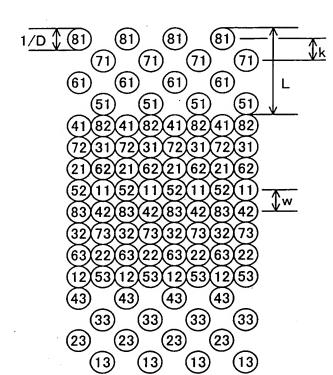
THIRD SCAN 1 L= 0.k SECOND SCAN RECORDING ORDER <u>=</u>3 MAIN SCANNING DIRECTION FIRST SCAN LEGEND: (31 NOZZLE No.

Fig. 2

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Fig. 26

OVERLAP SCHEME



NUMBER OF NOZZLES: N = 8 NOZZLE PITCH: k = 1 [DOTS] NUMBER OF SCAN REPEATS: s = 2 NOZZLE DENSITY : D [DOTS/INCH] SUB-SCANNING PITCH: L [INCH]

DOT PITCH: w [INCH]